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ABSTRACT

This paper explores possible intergenerational socialization into science on the part of mothers who are scientists in relation to their school-age daughters. Its aim is to describe ways in which mothers who are scientists foster or fail to foster orientation to science fields. The exploratory and naturalistic study is conducted in the "context of discovery" and intended to raise the issue of possible familial consequences of the growing participation of women in scientific fields. The research asks the questions: What difference does it make in terms of a child's orientation toward science to grow up in a home in which the mother is a scientist? How does the mother's profession structure knowledge dissemination in the family? How may it affect her socialization of her daughter and how does the daughter view the mother-as-scientist? An illustrative case study of interviews with a mother who is a research biologist in a large university and her 19-year-old daughter is reported and discussed. The complete data set is comprised of five sets of mother-daughter interviews and three pilot studies of mothers only. Findings from all the interviews are incorporated into the descriptive analysis in this paper. This study assumes that early experiences in the family of origin are influential in later parental functioning. Accordingly, the study describes home and school factors which facilitated the mothers' entry into science and compares them with the experiences that appear to be shaping their children's interests and activities. Also described are socialization factors such as parental expectations and encouragement, recognition of aptitude in the child, provision of appropriate experiences, monitoring of the child's activities, and role modeling and other aspects of anticipatory socialization. This study also adds interview data from the daughters reporting their perceptions of their mother's career, aspirations for their children, science activities in the home, and their own future plans. (KR)

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SCIENTIST MOTHERS AND THEIR DAUGHTERS (2)
AN INQUIRY INTO ONE ASPECT OF SOCIALIZATION INTO SCIENCE

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This paper explores possible intergenerational socialization into science on the part of mothers who are scientists in relation to their school-age daughters.[1] Its aim is to describe ways in which mothers who are scientists foster or fail to foster orientation to science fields. This exploratory and naturalistic study is conducted in the "context of discovery" and intended to raise the issue of possible familial consequences of the growing participation of women in scientific fields. In effect, the research asks the question: what difference does it make in terms of a child's orientation toward science to grow up in a home in which the mother is a scientist? How does the mother's profession structure knowledge dissemination in the family? How may it affect her socialization of her daughter. And finally, how does the daughter view the mother-as-scientist?

These questions can be put in the larger context of parental influence on children's school achievement and life course decisions. The home environment and parental beliefs and expectancies are widely recognized as a major influence on academic achievement in general (cf Walberg 1984), and, mediated by gender role variables, on children's self-concept, achievement attitudes, and career choice with respect to mathematics and science in particular(cf Eccles, 1983). Campbell et al (1988) has identified ethnicity as well as gender as parental influence factors affecting children's mathematics achievement However, there has been no study in any technical field that identifies the influence of parents who are themselves scientists.

Similarly, while there is a research literature on the effects of maternal employment on family dynamics and child-rearing (Lamb, 1985) as well as on children's academic and career choice (e.g. Hoffman,1975), no study has focussed on mothers working as scientists. The emerging literature on women scientists (Gornick,1983; Maehr & Steinkamp,1985) does not explore issues of socializing the next generation. In the role model literature, various studies have noted the importance of female role models in encouraging young women to enter science fields, but the implications of mothers as science role models have not been explored. Family occupational traditions as transmitted from father to son or, increasingly, from father to daughter have been studied; the recency of women's participation in science, particularly the participation of women with children, may explain the inattention to mother-daughter influences. We note the historical precedent of Marie and Irene Curie and the ties between science and family life (Abir-Am & Outram, 1987), and anticipate hopefully without undue optimism an increased possibility today for families to have two generations of female scientists.

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[1] The author is grateful to Montclair State College for a Separately Budgeted Research Award which supported data collection for this study.

Finally, we are unaware of of studies that investigate the child's view of the mother's occupational role in science. That is important not only because studies show that typically science interests occur early and that role models are important influences on career decisions, but also because from a phenomenological and interactionist perspective social reality is constructed by each of the parties of interest

It is not the intent of this paper to compare mothers' influence on their children's academic or career orientations to that of fathers or to compare the many additional factors - teachers, coursework, friends, the media, cultural norms, sheer chance and luck intertwined with individual temperament, abilities and other intra person variables -that may go to form a bewilderingly complex matrix of causality. Rather, the study takes a close look at the interactions of scientist mother and daughter so that issues of the significance of the mother's occupational role may be raised. In so doing, the data will necessarily suggest the richness of family life and other sources of influence.

In this paper, an illustrative case study of interviews with a mother who is a research biologist in a large university and her 19 year-old daughter will be reported and discussed. The complete data set is comprised of five sets of mother-daughter interviews, and three pilot studies of mothers only (Handel, 1986). Of the eight mothers studied, five hold academic research positions in the biological sciences and three are college professors of biology whose primary responsibility is teaching. They were selected as representative of two professional arenas in which science is practiced. Interview data was obtained from five daughters; two are daughters of researchers and three are daughters of college professors. Findings from all interviews will be incorporated into the descriptive analysis in this paper.

This study assumes that early experiences in the family of origin are influential in later parental functioning. Accordingly, the study describes home and school factors which facilitated the mothers' entry into science and compares them with the experiences that appear to be shaping their children's interests and activities. Also described are such well-recognized socialization factors as parental expectations and encouragement, recognition of aptitude in the child, provision of appropriate experiences, monitoring of the child's activities, and role modeling and other aspects of anticipatory socialization (Bloom, 1985; Eccles, 1983). The present study adds interview data from the daughters reporting their perceptions of their mother's career, aspirations for their children, science activities in the home, and their own future plans.

Method

Subjects were recruited through a snowball sample technique. Recommendations from previous respondents or contacts with others in the field were used to locate women in biology who were mothers of adolescent daughters. Biology was the discipline of choice because it has the greatest concentration of women and thus represents the best potential pool of subjects for any future large-scale study of mothers and adolescent daughters. To limit heterogeneity in the pilot study (Handel, 1986) subjects were selected from one field of the biological sciences and from one career path only, namely, biological research in an academic setting. In the second set of interviews, women whose main responsibility was college teaching of biology were included as well.

The women studied are in their forties and have held their present positions for at least five years. With one exception, they are Caucasian, and born in the United States; one spent her early years in the Middle East, but received all her higher education here. All of the women live in two-parent households and are married to men in professional fields closely related to their own. Their homes are in urban and suburban locations within a large metropolitan area. The children 's ages range from 13 to 19.

Data were collected by means of semi-structured interview protocols. Individual, ninety-minute interviews were conducted with each of the subjects. Mothers and daughters were interviewed in separate sessions. Mothers were interviewed first and asked not to share information prior to the daughter's interview.

Interviews with the mothers were designed to provide information in three general categories: work situation, family interaction, and individual experiences and attitudes. Specific areas of inquiry included: (a) career-related socialization in the mothers' family of origin and family of procreation (b) significant school experiences of the mother and the child (c) role model efficacy factors (derived in part from Kanter, 1977) such as impact upon the women scientists of the structure of work, resources, and rewards in science fields; plans and hopefulness regarding future work; effort or difficulty with past professional career and academic preparation; work performance and time demands; articulation between work and family roles; involvement of family in work-related activities; work-related cultural and personal values (d) explication of the structure of opportunity in science, including mothers' provision of information to child regarding preparation, college entry, areas of study, and stages of professional development

(e) home experiences and activities which provide substantive and procedural knowledge of science

(f) the support of appropriate school experiences and

(g) expectations and assessments of child's abilities, interests, and personality development.

Interviews with the daughters investigated the same areas as those in the mothers' protocol (c) through (g) in order to get the daughters' perspective on important issues and events. For example, daughters were asked about their own expectations and abilities, about science activities in the home, and about their views of their mother's work.

Case study methodology was used in the data analysis.

The Case Studies

Each of the two sets of mother-daughter interviews will be reported separately. Data from the mother's interview is organized to describe, first, the mothers' early home and school influences, career paths, marriage and childbirth patterns, and degree of career satisfaction, all of which are hypothesized to exert influence on the child-rearing environment; and next, the more proximate aspects of fostering children's orientation to science, namely, the mothers' assessments and expectations of their children, experiences provided by the home, articulation of maternal and professional roles, connections with their children's school, and influence of the dual career marriage on the children.

Data from the daughter's interview is organized to describe their school experiences and interests, their mother's connections with the school, science activities with their mother, perceptions of the mother's profession and career, and their own future plans.

Names have been changed to protect privacy.

Dr. Sarah Gates

Dr. Sarah Gates, age 48, has been engaged in neurophysiological research at a large research university for the past ten years. Her husband does related research and also has a clinical practice; he is a fourth generation physician/scientist. They have a daughter age 19 who has completed her first year of college and a son 15. At the time of the interview, Gates was awaiting a decision on promotion to associate professor

Early home influences Gates grew up in the metropolitan area where she now lives. The most striking early home factor involved her sister. Four year older and now a "very good" elementary school teacher, she was regarded as the "beautiful" daughter while Gates

was considered the "bright" one. Gates disclaims any parent influence on her science career, saying that while her parents encouraged her to work hard and do well, her mother in particular "didn't understand" her intellectual interests. Her mother was a high school graduate; her father left school in grade 11 to support his family. Describing her father as an "exceptionally intelligent person especially in mathematics," she recalls his homework help and how he always knew the right answer, but, interestingly, could not articulate, and therefore could not teach her, the problem-solving process.

High school and college Gates was "always interested" in math and the scientific method in high school, but found the coursework "pedestrian." College, she says was the "turning point " of her life. She had entered thinking of studying international relations, but at an ivy league women's college that she calls "a marvelous, marvelous place" professors first stimulated and then supported an ambition for a career in biological science. The excitement generated by an introductory zoology course determined her major. Summers, she worked in the lab of a woman physiology professor who was her particular "mentor and inspiration." She felt it was a wonderful way of life and also felt appreciated for the contribution she was making. Faculty gave both encouragement and practical help in getting into graduate school, a step she "would not have thought of" on her own.

Career path Gates' graduate education was funded, a necessity for her. After the Ph.D., she had a "very successful" post-doctoral fellowship, then a grant-funded university research position during the course of which she took several months off when her first child was born After four years, with funding becoming uncertain, she decided she wanted another child and "this was the time to do it." Unable to obtain funding for a well-regarded grant proposal, she lost her lab and decided to stay home with the baby ("my back was against the wall and anyway it seemed a lovely thing to do"). She stayed home for four years, then taught part-time for two. In all, there was a break of six years before resuming work in a research lab. In her present position, Gates directs her own lab, but is part of a larger umbrella lab.

Career satisfaction Gates projects calm self-confidence when discussing her career. With 30 publications, she considers herself a "self-supporting businesswoman," a reference to the entrepreneurial aspect of funding science research as well as to its typical products. As important she loves her work and feels gratified that she is "free to do something I enjoy." Experimental research is her passion; she will spend "nine to ten hours sitting in that lab all by myself doing that experiment just as happy as a pumpkin."

Recalling her college experience, she says "We were told we could do anything and so I did.." Apparently, gender has posed few obstacles despite her realization that few women are in the top ranks at her institution. Gates points out that the unusual course of staying out of research for six years didn't mean the end of her career. Her husband was supportive but sad and worried for her at that time. Gates, however, was sure she would get back into a lab.

Aspirations and expectations for children Since perceptions of children's abilities and temperaments affect the aspirations and expectations parents may hold for them, Gates was asked to describe her daughter Valerie. A "wonderful person" was her immediate response, adding that she was "very social" and had since babyhood a gift for making friends . Academically, she said Valerie wrote beautifully possibly taking after her father in that respect, was not interested in science and had not done all that well in science. Within technical fields, she thought that Valerie was drawn to the more theoretical disciplines of mathematics or chemistry, rather than biology, and wondered whether Valerie was reacting to her in that regard. Recently, however, as a result of one of Valerie's college courses, they could speak the same language about Gates' hormone research.

Gates hopes that at least one of her children will follow her well-loved specialty. Her son, she says, excels in science; she hopes he will be interested when he takes his biology course next year, but is "afraid to think about it." She was also pleased by the congruence between Valerie's college course and her own research. While she appears quite proud of Valerie as an individual, independent person, Gates seems to continue to hope that Valerie will turn to the biological sciences.

As for the future, Gates echoes her own experience in hoping that Valerie will see she has choices and alternatives and doesn't have to take a conventional route. She has told Valerie of her own seminal experience in college where women were told they could do anything. She thinks Valerie too given her resourcefulness and drive will be able to do whatever she wants.

Home-Science Connections Gates tries to keep her work separate from the home. Especially when her children were little, she says she didn't talk about her work, but now the children would "probably say that's all I do - talk to Daddy at the dinner table about science, science, science.". Her animal experiments preclude greater sharing of her work with the children She seldom brought Valerie or her brother to her lab, feeling the experiments would upset them. .She recalled one incident when Valerie was horrified to see her anesthetize a laboratory rat, and knows her daughter would not want to watch or participate in other experiments. Valerie's attitude, she said with a tinge of exasperation,

was almost like"eek, a mouse!" Gates has also encountered negative attitudes from her son, a defender of animal rights. She wishes her children could see the "love" she has for experimental science.

Less directly related to her work but still significant as an orientation to science are summer activities with the children at the family's country place. There since the children were little Gates took them on nature walks in the isolated rural area, teaching them to observe the flora and fauna and their characteristic habitats.

A second major connection between Gates' professional training and her child-rearing experiences is the way she discusses sexuality with her children. With both her daughter and son, she has shared a biological and matter of fact approach to sex, describing it as one would describe other physical functions and needs, and as one of the characteristics of human, not just teenage, physicality. She says she brings herself into the discussion as well. The discussions are not coldly clinical, but deal with the range of emotions and issues. Valerie is expected to make her own decisions about sex; when Valerie asked her opinion about relations with her boyfriend, Gates told her she should deal with it herself. Gates considers the open communication she has with her children to be a hallmark of successful child-rearing. In that regard, she .sees herself as very different from her own mother. She

School connections Both of Gates' children went to private high schools. Assessing Valerie's education in terms of her teachers, Gates regrets that she did not protest the mediocre science teacher who taught her daughter for two years. Also, while Valerie had an excellent chemistry teacher, she could not enroll in the advanced course because that teacher was so poor. Gates has been somewhat more involved with her son's schooling; she feels is not working up to capacity and worries about his future. She also took action on the animal rights front. She called up her son's school to protest a graphic depiction of animal experiments and told them someone should explain the other side of the issue as well.

Dual careers and their influence on children Gates recognizes that science talk at home between wife and husband evokes negative reactions from the children, a point that Valerie will emphasize.strongly. That phenomenon of dual science careers serves to exclude the children. It is important to note, however, that the Gates are not exclusively a science family. Gates' husband has strong intellectual interests in the humanities; he is a writer and poet. Valerie and her father discuss literature together while Gates "stays out of it." Valerie and her mother spend much time just talking with one another. Valerie's younger brother is a graphic artist. .Gates reports that her husband has encouraged their

son to follow his family tradition and become a physician , but has apparently not encouraged Valerie to do likewise.

Valerie Gates

At nineteen, Valerie is a cosmopolitan young woman who talked freely and enthusiastically after some initial shyness. She has completed her first year of college. She has a summer job selling in a retail clothing store.

Schooling and Interests Valerie describes herself as "temperamentally interested in people problems" and a prospective psychology major. She was somewhat disappointed in her first college course because it dealt with physiological rather than social aspects of psychology. She also took a biology course at her mother's suggestion but thought it "useless" as far as advancing her interest in psychology was concerned. Valerie got turned on to psychology in her last year of high school by an "amazing" teacher who, unlike others in Valerie's experience, conducted her classes as "open and honest" discussions.

Mitigating somewhat Valerie's focus on psychology is her assessment that she is good at academics "across the board" including mathematics and science.

Parent-School Connections Valerie is aware of her mother's continuing interest in her science courses, reporting such details as her mother's inquiries about what she was doing in her college lab work, but, unlike her mother, does not express pleasure in the sharing of substantive information. Rather, she focuses on the personal interaction aspects of her mother's connections with her schooling and science coursework. For example, recalling a bad experience with a poor teacher in tenth grade biology, Valerie remembered her mother feeling upset "in terms of how I closed off this option for myself and saying "Just don't give it up yet. Take a good biology course where the instructor is good." Valerie said her mother was "dead set" on her taking biology again in college just to see if she would like it. "And I did like it!" Valerie said with some surprise.

Another more negatively tinged example comes from earlier in her school life when Gates came to her class to talk. Valerie recalls the incident vividly:

> "I was really embarrassed. I was doodling and wasn't paying attention to what she was saying. My teacher came over and took the paper and said 'Pay attention!'..It was way above all our heads, and we didn't understand one thing she was saying except for the really really smart people who asked all these interesting questions. She was thrilled by that..She never did it again,

> even though the teacher said it was wonderful, you have to come back when they're a little older and they'll understand better."

Valerie didn't remember what her mother talked about, but knew she wore "a butterfly blouse."

In a lighter vein, Valerie recalled her mother's astonishment that she was given a long division assignment for homework when she didn't know long division and a nighttime trip across town with her mother for a piece of university stationery on which to write a protest note to the teacher.

Science-Home Connections Valerie does not perceive her home as rich in science connections and those that do exist are likely to be viewed negatively. When asked what stood out about having a mother who was a biologist, Valerie criticized both parents :

> "Like dinner time is always annoying for me..They (her parents) used to talk about science all the time. My brother and I would just sit there and be so annoyed,. They'll use those big words...My brother and I didn't have any clue what they're talking about. We used to feel really left out. We used to say: Why can't you discuss this another time besides dinner, because this is a family time, and it's ridiculous?"

Valerie and her brother retaliated by talking about baseball or other things her parent knew little about, just to annoy them. She concedes that the objectionable dinner talk occurs less often now, and that she and her brother "kind of gear" the conversation towards themselves. "Selfish as we are," she smilingly concludes.

Another disconcerting situation involves a friend who is very interested in biology and likes to talk with her parents while Valerie sits by excluded and bored.

Speaking more positively, Valerie recalled a time when her mother had her microscope at home and would sometimes make slides with her using skin cells or hair. She remembers thinking that was "really neat." Less clearly, she remembers receiving several general science books from her mother.

In Valerie's view, perhaps the most positive and useful characteristic of her scientist mother was her ability to explain problems clearly. When Valerie went to her mother for science or math help, her mother would show her how to do it "This is how you do it," she would say whereas her father would merely point out the right answer and tell

her to look at it. Counter to the stereotype, Valerie typically sought her mother for math and science help and her father for English and languages.

Perceptions of Mother's work and science career Valerie was able to give a general summary of her mother's research and career. She understands the conditions of academic research, but her concept of a scientist is a negative one that evokes an image of the isolated worker:

> "I always think of my Mom's office and the thing that I don't understand about her is that .. I couldn't sit still and do an experiment in a room by myself for five hours and not have anyone to talk to..I always just think of her sitting there with her microscope,.her computer, or just writing in room by herself. And I just, I don't know, I can't do that...I would be very lonely"

When Valerie asks her mother whether she gets lonely "she says 'no, I love it."

Despite these negative perceptions, Valerie takes delight in her mother's enthusiasm for science and in her success. Responding to a question she says, "She loves her work. She just loves it..She loves research and she loves giving papers. She gets all excited going to interesting places and giving papers." When asked how that made her feel, Valerie said "Oh! thrilled for her,. absolutely thrilled for her!"

Valerie has observed her mother's work habits and sees her as very organized and analytical. She notes another difference from herself as well.

> "She has this very analytical mind. She can take one thing and just systematically look at it and take it apart and figure it out. Whereas for me I don't really care where it came from as long as I know where it's going." She has all these hi-liters (that she uses) at work. She thinks things through, does things slowly and systematically."

In domestic, private life, however, Valerie paints a contrast. There she sees her mother as sociable, not isolated, talkative, affectionate and disorganized; the house is "a mess." She feels her mother is always accessible for social communication. "We hit it off," Valerie says. "We can talk about anything; if ever I have a problem socially I'd go talk to her. I have on hundreds of occasions."

In sum, Valerie's perceptions complement her mother's assertion that she keeps her work and home life separate. The daughter sees two different, contradictory aspects of the mother, one of which in the work role she finds uncongenial, the other in the maternal

role she finds supportive and gratifying. Unsurprisingly, Valerie reports that her most enjoyable experience with her mother's work came during the brief period when Gates was teaching; Valerie enjoyed watching the social interaction in the classroom.

When asked her assessment of science careers, Valerie mentioned first the benefit of autonomy. With one's own lab, you could keep your own schedule ; your work doesn't depend on anyone and no one is inconvenienced. She contrasted this with friends' parents who have deadlines imposed on them, but also recognized that experiments, once scheduled, pose their own demands of long hours in the lab or night work. Also, she feels that science means hard work without commensurate financial reward. "With all the work both my parents do.all the time and effort and heart they put into it.. they should be millionaires." Valerie admires their dedication including her father's pro bono clinical services, and says her parents "give the impression that if you love something it doesn't matter how much you get paid."

Future Plans Valerie will "probably" major in psychology but holds out the prospect of a liberal arts major as well. Pondering the fact that she's very good at math and science - " it may be in my genes."- she says she wants "to do something on my own, different from" her parents and wonders whether children in two parent science families "felt turned off by that and made them go towards something just the opposite of science?"

Valerie does not feel pressured by her parents. She feels her parents are content to let her do pretty much what she wants to do. and that they never pushed her in science directions or wanted her to be a scientist, although she senses their interest when she is involved in science courses. Valerie is aware of the generations of physicians in her father's family and thinks her brother might follow in their footsteps.

Valerie wants to have money; she would like to marry a man with money, especially for the sake of her children, she hastens to add, so she could.maybe stay home with them a while. But she knows the conflict. She says it would take luck, as her mother was lucky, to get back into a field once she had left for full-time child rearing .

While no predictions of future work can be made, it seems clear that Valerie does not dislike biology except for animal experiments, but rather is drawn to activities that are more person-centered. What she does find uncongenial is the life of a science researcher, the hours of solitary concentration and isolation from others. Rounding out the picture of mother as scientist is her appreciation of her mother's love for her work and a relationship characterized by open communication and rapport

Discussion

Illustrative case studies of a scientist mother and her daughter have been presented in the preceding section. This Discussion section will integrate findings from the additional case studies (four mother-daughter sets and three mothers only) using issues suggested by the Gates data as touchstones.

First and most obviously, the women studied are living lives very different from those of their own mothers. Not only have they achieved a higher socioeconomic status, but they have prestigious positions in a male-dominated profession. With one exception, the older women did not work outside the home at all.

Significantly, none of the women credit their mothers with sparking their interest in science or strongly supporting their graduate study or careers. At best, their mothers are pleased; at worst, they are deeply puzzled. In the families of origin, fathers were more likely than mothers to involve daughters in science-related activities.

All the women studied recounted a seminal educational experience centering on an exciting teacher that crystalized their interest in science. In addition, the academic researchers reported a special laboratory experience that seized their imagination and turned them on to experimental research. While the teacher was as likely to be male as female, seven of the eight women also reported the influence of a special female role model or mentor during the course of their education. Awareness and experience of sex discrimination in higher education and the sciences varied by the individual.

Two factors appear to distinguish the early career course of these women from that of the typical male scientist. First, three of them came to science late - in college as did Gates - whereas males typically select a science future in high school; second, for Gates and three others there were time gaps in their research careers - unusual in the highly competitive world of academic science and indicative of the need to consider gender as a variable in this as in other arenas. It should be noted that the interruptions were not due to family demands , but to financial considerations or uncertainty about their professional direction. Gates, it will be recalled, decided to have a second child and lost her lab because the funding had dried up.

All of the women express a strong sense of personal autonomy consonant with their professional status. The researchers value the opportunity to do their own work. The college professors, while often seeking occasions to pursue their own research interests, value the freedom of the academic schedule mainly because it gives them time to tend to

their children during the workday; they see autonomy as the ability to negotiate their work and familial roles. One faculty member, tempted by the higher salaries of private industry, concluded it was not worth giving up the freedom she had at the college. The Gates daughter was keenly aware of her mother's professional autonomy, the others less so

With the exception of one researcher who finds competition and high pressure grant-seeking distasteful, all of the women are happy in their work, a major factor in projecting a positive role model. The daughters appear to recognize their mother's satisfaction. Valerie Gates, oldest of those interviewed, was mature enough to empathize with her mother's enthusiasm even as she finds her work life uncongenial.

The women were eager to speak of their children during the interviews. It was apparent that child-rearing was an important part of their identity. Curiously, however, although they are often critical of their children's high school science courses and teachers, they were not proactive with regard to the child's schooling and seldom intervened. That seems particularly surprising in view of the importance of science teachers in their own education. Rarely too were supplemental or enrichment courses sought out to compensate for any lack in the school. Perhaps the lack of initiative is due simply to the busy pace of their lives. In any case, it is of a piece, particularly for the researchers, with a more general attitude of respect and confidence in their children. While wanting their children to do well, the mothers report a relaxed confidence about their future and both mothers and daughters disclaim any parental pressure for career directions or for science careers in particular.

One might speculate that just as the women received no science orientation from their mothers so they do not exert pressure on their own children. Whether or not a generational effect is operating here, the mothers' democratic child-rearing and confidence that their children will be able to do what they want to do indicate a valuing of individual decision-making and independence or, in other words, of the type of autonomy characteristic of the mothers themselves. Thus it may be that the mothers are replicating in their daughters that type of autonomous personality characteristic of scientists and other professionals.

The mothers take pride in their daughter's individuality, several reporting that she has " a strong will" "a mind of her own." Notably too the mothers report with pleasure their daughter's differences from them. The research biologists commented most frequently on their daughter's sociability as compared with their own more inward childhood. It would seem that conflicts over gender-appropriate behavior still resonate for those mothers.

Clearly, the daughters are leading different lives as young women than their mothers did. Most obviously, they have a close-up view of what it means to be a scientist. Whether they look through a favorable lens or not, their home experience constitutes an orientation to science.

They have a general understanding of the work their mothers do, they are aware of her work environment and career path, and it has been the mother either alone or in concert with the father who has provided home or recreational experiences related to science. While it is not clear how well the daughters understand their father's work in those cases where the father is also a scientist the mothers' accessibility to her children has appeared to provide them with opportunities to learn. Given the importance of role models, the fact that females have fewer science role models than males and given the need to establish a societal expectation of the gender role appropriateness of science for women, it seems likely that these daughters have acquired an important perspective on the "naturalness" of mothers as scientist.

As reported, knowledge does not necessarily mean personal interest or the adoption of a socially available role.. Valerie Gates finds the solitary research too lonely; another daughter thinks lab work is messy and unfeminine because you can't wear nice clothes; other children are drawn to different activities. Only one daughter of those interviewed expects to enter a science field.

The daughters witness also the tensions of a career in the sciences and the commitment it entails. All recognize that their parents work very hard and say they would not do so themselves. They are aware of and bothered by the fact that the financial rewards are not great. The children say they want more money for themselves when they are adults. These negative aspects are heightened in the families of the academic researchers where the marital partners are also scientists. The parents' intense shop talk is resented. The "annoying" tactics of Valerie Gates to break into her parents' conversation is found in the homes of the other researchers; one daughter "babbles back technical terms" at the dinner table to make her parents stop. The daughters' sense of exclusion is keen. A related incident is Gates' presentation to Valerie's class, incomprehensible to the daughter.

At issue is accessibility to the children of the language of science and the parents' science activities. Here the college professors have an advantage. Being teachers, they

work with people and their activities are more obvious and understandable to a school-age child; Valerie Gates confirms this observation when she reports the fun of visiting seeing her mother's classroom during a brief period when she had a teaching position. The college faculty, being teachers, are also more involved in helping their children with their school science and directing them to relevant books and other resources. Thus, it is interesting to note that the daughters of the college biologists have greater exposure to the realities of their mother's work, including contact with students, and resources in the home, and that their mother's work helps equip them to deal with that other major area of their life, their schooling. One daughter of this group recounted her enjoyment at "knowing a little bit more" than others in her class; another said her mother was her own "special tutor" for coursework. This difference between the two groups of biologists is due in part to the less esoteric work and less competitive work environment of the college professors. Their quality of integrating family and science activities raises echoes of an earlier time when women gained access to science through their families and their work was a family affair(Abir-Am & Outram, 1987)

The issues of connection with a child's feelings ,the perceived usefulness of science to a child and its integration with other aspects of the child's life are important ones, connected to the large body of research in mathematics and science dealing with gender issues (for reviews, see Eccles,1983 and Linn & Hyde, 1989).

This paper has presented both positive and negative aspects of mother as scientist as perceived by their children. Whatever their judgement, however, it is apparent that the daughters are proud of their mothers - Valerie Gates is "thrilled" by her mother's achievements - and this may be a major finding that resonates in the daughters' lives now and in the future.

In investigating antecedents and consequences of the entry of women into a scientific field , this paper has attempted to explore factors that may constitute intergenerational socialization into that field. and to raise issues. The particular type of science work that the mother engages in has been identified as an important variable. The next step in the research agenda is a full-scale study of scientist mothers and the ways they foster, or fail to foster, orientation to science on the part of their daughters. In addition, since the present research suggests that parents' interaction as science couple has consequences for the children, comparison groups in which only one parent is a scientist might also be studied.

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